Citation:

Papas MA, Alberg AJ, Ewing R, Helzlsouer KJ, Gary TL, Klassen AC. The built environment and obesity. Epidemiol Rev. 2007;29:129-43. Epub 2007 May 28. Review.

PubMed ID: 17533172

Study Design:

Systematic Review

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine the published empirical evidence for the influence of the built environment on the risk of obesity.

Inclusion Criteria:

- a direct measurement of body weight(eg body mass index(BMI)
- at least one objective measure of the built environment
- english articles
- humam population
- January 1, 1966 and February 1, 2007

Exclusion Criteria:

articles that examined neighborhood characteristics and obesity

Description of Study Protocol:

Recruitment

A Medline search was conducted using the keywords "obesity" or "overweight" and "neighborhood" or "community".

A second search was conducted using the keyweords "obesity" or "overweight" and "built environment" or "environment"

Design

cross-sectional design (18/20)

longitudinal studies (2)

Blinding used (if applicable)

none

Intervention (if applicable)

none

Statistical Analysis

multilevel modeling

Data Collection Summary:

Timing of Measurements

cross section : 1966 to 2007

longitudinal studies: 3yrs, 7yrs

Dependent Variables

- Variable 1: BMI(weight(kg)/height(m)^2)

Independent Variables

built environment

Control Variables

age

race/ethnicity

Description of Actual Data Sample:

Initial N:

343

Attrition (final N):

20 studies

Age:

children

adolescent

adult

Ethnicity:

non-Hispanic white

African Americans

Hispanic

Other relevant demographics:

income

marital status

Anthropometrics

Adults

BMI > 25 and < 30 = overweight

BMI > 30 = obesity

children/adolescents

BMI > 85th percentile and < 95th percentile = overweight

BMI > 95th percentile = obesity

height

weights

Location:

United States

Australia

Europe

Summary of Results:

Key Findings

Diet:

- Studies examined access to physical activities opportunities or access to food outlets.
- Three of the four studies that examined density or food prices found positive associations with BMI.
- The number of residents per fast food restaurant and the number of square miles per fast-food restaurant were significantly($p<0.05$) associated with the prevalence of obesity at the statewide level.
- Lower area food prices for fruits and vegetables were also associated decreases in BMI over a 3-year period for children aged 4 and 5 years.
- The presence of supermarkets was statistically significant with lower prevalence of obesity (prevalence ratio (PR) = 0.83(CI 0.75,0.92) and overweight (PR = 0.94, CI 0.90,0.98)
- The presence of convenience stores was statistically significantly associated with higher pervalence of obesity (PR=1.16, CI: 1.05, 1.27) and overweight (PR = 1.06, CI 1.02,1.10)
- The density of the food establishment per 1000 residents in each zip code was not associated with BMI for adults in the WISEWOMAN Study, statistical significance not mentioned.
- For adults, distance to the grocery store was associated with obesity; in comparison with persons who grocery store was within their census tract, persons who shopped more than 1.8 miles away had greater BMIs($\beta=0.78, p<0.05$)

Physical Activity:

- There was no association with the distance from the child's residence to the playground and BMI
- Of the two studies in adults that computed the distance from the participants home to the recreational facility there was a positive association with an increase risk of overweight.
- The two studies investigating the number of recreational facilities within a census block in an adolescent population found a positive association with the risk of overweight.
- Mobley found a negative association with density and BMI (β= -1.39)
- Two studies examined measures of transportation found significant positive associations between the measures of use of motorized transportation and the risk of obesity.

17 out of 20 studies found a statistically significant relation between some aspect of built environment and risk of obesity.

Table 1: Summary of the evidence for an association between the built environment and the risk of obesity, by type of exposure measurement

Study Findings/built environment	BMI	RR	CI	β	Statistical Significance of Group Difference
Overweight/Obesity was associated with living on highway, street without sidewalks and having access to 4 or more facilities	BMI ≥ 25 BMI ≥ 30				positive association
Residents of low walkability had higher BMIs and were classified as overweight	BMI> 25 BMI ≤ 25			-0.054(SE, 0.028)	p < 0.05
Sprawl index was associated with BMI at the county-level	BMI ≥ 30 BMI < 30				positive
Increased mixed land use and daily distance walked were associated with obesity	BMI ≥ 30				positive(stronger among whites)
Urban sprawl associated with overweight and obesity	BMI > 25 BMI ≥ 30	1.02 1.02	95%: 1.01,1.02 95%: 1.01, 1.02		
No association with metropolitan sprawl index and BMI				0.001	not significant
Vehicle miles traveled	BMI	r = 0.79			p < 0.05
commute time	BMI ≥ 30	r = 0.55			p < 0.05
population density		r = -0.342			p < 0.05
living in rural working class exurban mixed race/ethnicity urban	BMI BMI ≥ 95th %	RR=1.4 1.3 1.3			
Odds of obesity with physical activity facilities per block	BMI ≥ 95th %	0.95	0.9,0.99		
(declined)					
supermarkets	BMI > 25 and ≤ 30	PR = 0.94	0.90, 0.98		
grocery stores	BMI > 30	PR = 0.83	0.75, 0.92		
convenience stores	BMI > 25 and ≤ 30	PR = 1.03	1.02, 1.10		
	BMI > 30	PR = 1.07	1.05, 1.27		
	BMI > 25 and ≤ 30	PR = 1.06			
	BMI > 30	PR = 1.16			

shopping in census tracts	greater BMI values	0.78	p<0.05
shopping outside(1.8 miles away)			
density of food establishments per 1000 adults:(no association)		-0.37	
grocery stores		0.09	
fast-food restaurants		1.19	
regular restaurant		-0.25	
minimarts			
density of food prices with BMI	BMI		positive
residents per fast-food restaurant		-0.23(SE 0.001)	p < 0.05
square miles per fast-food restaurant		-0.24(SE0.001)	p < 0.05
prices for fruits and vegetables (children 4 to 5 yrs, for 3 yrs)	BMI (decrease)	0.114(SE0.033)	p < 0.001
land-use mix	BMI (decrease)	-2.6	
fitness facilities		-1.4	
total miles traveled/d	BMI $\geq$ 30		positive
total minutes commuting to work			

Other Findings

Author Conclusion:

Most articles reported a statistically significant positive association (84%) between some aspect of the built environment and obesity. Several methodological issues were of concern, including the inconsistency of measurements of the built environment across studies, the cross-sectional design of most investigations, and the focus on aspects of either diet or physical activity but not both.

An understanding of the built environment-obesity relation in different racial/ethnic groups may aid in the develpment of culturally specific community-level obesity prevention programs. Conflicting results were evident for the association between land-use mix and risk of obesity. The reasons are unclear.

Two studies reviewed were conducted outside of the US, limiting the generalizability of the findings to the non-US populations. Social patterning of food availability may not be as evident in other developed nations.

More research on the impact of the built environment on obesity is needed.

Reviewer Comments:

The review was difficult to conceptualize. The discussion did not follow the table in a systematic way. It was helpful that the author discussed the conflicting results of positive and negative associations within the same built environment. His statement that 17 out of 20 (84%) studies showed a positive association was helpful.

The discussion section concentrated on the study's limitations and did not give a overall summary of the results. It would have been helpful if the author would have given a final summary.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes

4.	Will the information, if true, require a change in practice?	Yes

Validity Questions		
1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	Yes
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes